Bacteriological Follow-up Protocol for Waterworks Regulated by Saskatchewan Environment

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EPB 205

Saskatchewan Environment
Environmental Protection Branch

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Executive Summary

This document summarizes the intent, rationale, responsibilities and scope of activities of agencies involved in the monitoring of the bacteriological quality of drinking water in Saskatchewan Environment (SE) regulated systems.

This document is to be applied to Saskatchewan Environment "human consumptive use" regulated systems. The document does not apply to "hygienic use" systems and may not apply to all portions of a shared water system. Human consumptive use and hygienic systems are defined in *The Water Regulations, 2002*. For shared systems, bacteriological follow-up procedures will be dealt with through separate protocols developed by Health Regions, First Nations Authorities, Health Canada and SE's EcoRegions.

The rationale for requisite monitoring of drinking water quality as subject to Section 32 of *The Water Regulations, 2002* is to ensure that the microbiological quality does not exceed levels specified in the regulations. The monitoring of microbiological quality of drinking water is a critical component in protecting the health of those persons consuming drinking water from municipal and other communal systems. Analysis is presently conducted for total coliform, faecal coliform, *Escherichia coli (E. coli.)* bacteria or background bacteria growth. Bacteriological water quality standards include zero detectable total coliform bacteria per 100 milliliters (mL), zero detectable faecal coliforms per 100 mL and background bacterial levels of less than 200 organisms per 100 mL or no overgrowth.

The confirmed presence of total coliform bacteria, overgrowth bacteria or greater than 200 background bacterial colonies in drinking water samples indicates that treatment may be inadequate or the distribution system is experiencing bacterial regrowth problems or infiltration. Total coliform bacteria and/or background overgrowth are not necessarily indicators of the presence of faecal contamination or *E.coli.* but can represent some health risk.

Routine samples from distribution systems are used to detect potential problems with the bacteriological quality of drinking water. Analysis of routine samples can indicate the presence of total coliform, background bacteria, overgrowth or *E. coli.* bacteria.

Repeat samples are requested when the analysis of routine samples indicates positive results. Repeat samples will confirm the presence or absence of total coliform, overgrowth or *E.coli.* bacteria. Repeat samples are useful in determining if the initial indication from routine samples was the result of sampling errors or if bacteriological contamination of the drinking water supply really exists. Repeat samples are also used to determine if remedial actions have resolved the water quality problems.

Special samples are requested when analysis of the repeat samples show positive results. Special samples are used to determine the extent of contamination within a distribution system and to check if remedial actions have resolved the water quality problems.

Precautionary Drinking Water Advisories (PDWA) and Emergency Boil Water Orders (EBWO) may be issued anytime when a problem with a waterworks has been identified. PDWAs are issued by a SE EcoRegion (ER), in consultation with the Health Region (HR) when there is a possibility that problems may exist although an immediate public health threat has not been identified. EBWOs are issued by the Medical Health Officers (MHOs) or designates of the local

HR, in consultation with ER, when a threat to public health exists. Examples of PDWAs and EBWOs are provided in Appendix E.

The owners and operators of waterworks regulated by SE are responsible for ensuring that safe and potable water is provided to consumers. SE, while regulating municipal waterworks, various pipelines and larger private waterworks, also aids waterworks owners and operators in resolving problems associated with these supplies with the assistance of Saskatchewan Health (SH) and HR. The role of waterworks owners, SE and SH/HR is further described below.

Waterworks Owners
Owners of systems are required to monitor the quality of the drinking water and subject to Section 37 of *The Water Regulations 2002,* immediately report to SE any known or anticipated process upset, bypass conditions, operational anomalies in a waterworks, any instance where disinfection equipment fails or where the level of disinfection are not achieved or anticipated to be achieved as required by Subsection 30(6). They are also required to act on direction or advice from ER and HR to resolve problems or to prevent health hazards (Section 39).

Saskatchewan Environment
Environmental Protection Branch (EPB) staff receive analytical results from Saskatchewan Health's Provincial Laboratory (SHPL), record these results in SE's database and report all positive bacteriological results to the ER. In addition, EPB also reports the negative results for "repeat" and "special" samples to the ER. Furthermore, EPB notifies the HR about all positive results and the negative results for "repeat" and "special" samples.

Upon receipt of positive results of routine samples ER will advise the owners or operators of water systems regulated by SE regarding the need to obtain repeat samples and obtain information regarding the recent operational status (eg. Recent water main breaks and the status of the disinfection equipment) of the treatment/distribution system . ER staff will also provide advice to owners/ operators on steps and methods to resolve bacteriological water quality concerns and conduct inspections. ER staff will contact the HR to discuss public health concerns and the issuance of an EBWO or PDWA and arrange contact with municipalities or waters owners/operators to discuss the required actions associated with an EBWO or PDWA. ER staff are responsible for issuing PDWAs, in consultation with the HR, when indicated and judged necessary on the occurrence of positive results. ER staff work in consultation with HR staff when considering rescinding EBWOs or PDWAs.

Saskatchewan Health / Health Regions
SHPL provides analysis of routine, repeat and special samples collected by the owners/operators of waterworks regulated by SE and reports these results on a prompt basis to the EPB. The SHPL will immediately contact the MHO and EPB or designate in the event of a positive *E.coli.* or faecal coliform test.

HR staff including Senior Public Health Inspectors and MHO work with ER staff at various stages of the bacteriological follow-up to determine if risks to public health exist as indicated by drinking water sample test results and occurrence of disease outbreaks. HR staff will discuss the issuance of an EBWO or PDWA with ER staff. HR staff will also be in contact with the municipality to discuss the required actions associated with EBWOs. MHO or designates are

responsible for the issuance of EBWOs, in consultation with ER staff. The HR will notify as soon as possible SH's Population Health Branch of the issuance of an EBWO. HR staff may investigate plumbing at specific sites where necessary to determine if cross-connections occur. HR staff work in consultation with ER staff when considering rescinding EBWOs or PDWAs.

1. Introduction

SE sets standards, objectives and monitoring guidelines for SE's regulated waterworks. SE expects municipalities and owners of communal waterworks systems regulated by SE to comply with the requirements.

SE works with SH and the HRs and uses a case by case risk management approach that considers factors such as source water, treatment, distribution system, cross-connections in the building plumbing system and an operator's level of skill when dealing with bacteriological quality concerns.

In order to provide the safest possible drinking water to consumers, all aspects of a multi-barrier approach are necessary. The aspects of a multi-barrier approach include: source protection; utilization of a proper treatment process; good operation and maintenance of waterworks; comprehensive drinking water quality monitoring program; and appropriate abatement and enforcement measures.

Water samples taken from SE regulated systems in the province may show the presence of bacteria from time to time. Positive bacteriological samples, in many cases, do not necessarily mean that there is a serious problem with the drinking water; it can be an isolated event caused by a sampling problem. However, when a test result indicates the presence of bacteria, actions should be taken to ensure that the drinking water is safe for consumption.

This document outlines steps that EPB, SH, Saskatchewan Health's Provincial Laboratory (SHPL), SE's EcoRegions (ER) and the HR should take to abate the risk associated with positive bacteriological results. This document is to be applied to Saskatchewan Environment "human consumptive use" regulated systems. The document does not apply to "hygienic use" systems and may not apply to all portions of a shared water system. Human consumptive use and hygienic systems are defined in *The Water Regulations, 2002*. For shared systems, bacteriological follow-up procedures will be dealt with through separate protocols developed by Health Regions, First Nations Authorities, Health Canada and SE's EcoRegions

It should be noted that it is the responsibility of the municipality/owner of the waterworks to continue to ensure that routine monitoring samples for bacteriological analysis are collected during all positive bacteriological follow-up procedure incidents.

Notwithstanding this protocol, a PDWA or an EBWO can be issued anytime a condition or a problem with the waterworks is identified as noted in The Guidance for Issuing and Rescinding Emergency Boil Water Orders and Precautionary Drinking Water Advisories (Appendix B).

2. Definition

"Positive" bacteriological result means a test result indicating unacceptable levels of bacteria per 100 mL of sample volume in accordance with the following criteria:

- 1 or more total coliforms (TC); or
- 1 or more faecal coliforms (FC); or
- overgrowth (OG) or >200 colonies of background bacteria; or
- presence of *Escherichia coli*.

"Precautionary Drinking Water Advisory" (PDWA) means an advisory issued by ER when the ER and HR determine that drinking water quality concerns exist but immediate public health threats have not been identified.[1] [2]

"Emergency Boil Water Order" (EBWO) means an order issued by the **Medical Health Officer (or designate) of the local HR**, when the HR and the ER determine that a threat to the public health exists.[1] [2]

"Routine" samples mean the water samples taken in a waterworks system to fulfill the sampling requirement as stated in the Permit to Operate issued to the system owner or municipality.

"Repeat" samples mean the water samples taken when the "routine" samples have been identified/tested "positive".

"Special" samples mean water samples taken when the "repeat" samples have been identified/ tested "positive". For every one (1) "positive" repeat sample, three (3) "special" samples are required, one (1) taken from the same location at which the "repeat" sample was collected; one (1) taken from upstream of the "repeat" sample and one (1) taken from downstream of the "repeat" sample.

3. Routine Samples

The SHPL performs Total Coliform (TC) analysis on all routine samples. In the case where the analysis indicates the presence of TC, overgrowth or background bacteria of >200 colonies, the SHPL will perform an *E. coli* test by swabbing the TC plate. The result from the *E. coli* test is available 24 hours later and provided to EPB. SHPL will immediately provide positive *E. coli.* results to the HR. In addition, the SHPL sends (by regular mail) test results to municipalities. The EPB in Regina obtains bacteriological test results from the SHPL on a daily basis. The results are entered into a database and the follow-up procedure, discussed below, will be initiated by EPB if positive results are noted.

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[1] Before issuing a EBWO or PDWA, information on the following should be gathered and considered: the integrity of the water treatment and distribution system; the sampling technique; and/or reports of illnesses related to waterborne diseases in the community. See Appendix B "Guidance for Issuing and Rescinding Emergency Boil Water Orders and Precautionary Drinking Water Advisories" for more information.

[2] In the event that the ER or HR cannot get a hold of one another they have the authority to issue on their own. Should this occur the issuing agency shall notify the other of the issuance as soon as possible.

3.1 Routine Samples – Positive Results

The following actions are necessary when a routine sample tests positive for any parameter:

- EPB will notify the responsible ER by phone and by e-mail;
- EPB will e-mail the local HR;
- ER will contact the municipality/owner to provide direction and request information as outlined in the positive regular follow-up procedures (Appendix D);
- ER will determine if an inspection is required based on information gathered in the previous point;
- ER will review/assess the treatment, historical water quality data and file information; and
- other follow-up actions are specified below in Article 3.1.1 to 3.1.3 inclusive.

3.1.1 Routine Samples – Positive TC, OG or >200 Background Bacteria

The local HR does not need to take any actions at this time.

3.1.2 Routine Samples – Positive E. coli

The ER will contact the HR to discuss the results of the information obtained from the positive routine sample follow-up procedure, the results of any inspections and determine if a PDWA or an EBWO should be issued. (See Appendix B – "Guidance for Issuing and Rescinding Emergency Boil Water Orders and Precautionary Drinking Water Advisories").

- the ER/HR will issue a PDWA/EBWO if required. If a PDWA is issued the ER will contact the municipality/owner to discuss the required actions. If an EBWO is issued the HR will contact the municipality/owner to discuss the required actions;
- in the event that a PDWA or an EBWO is issued, the ER will advise EPB. HR to advise SH;
- if a PDWA/EBWO has been issued, the ER will advise the owner or municipality of the sampling requirements to rescind the advisory/order (see Appendix B – Section 3);
- if an advisory/order was not issued, ER will advise the owner or municipality of the repeat or special sampling requirements; and
- the subsequent test results and the owner or municipality's remedial actions will be monitored by the ER. The ER will keep the HR advised.

3.2 Routine Samples – Negative Results

3.2.1 Routine Samples – Negative TC or OG or <200 Background Bacteria

- No follow-up actions are required

3.2.2 Routine Samples – Negative E. coli

- EPB staff will update the database;
- the local HR does not need to take any actions at this time; and
- other actions will be based on the test result of the repeat sample.

4. Repeat Samples

The SHPL will perform both TC and FC analysis on all repeat samples. As well, the *E. coli.* analysis will be performed on any positive TC or FC plate. Results are provided to EPB and HR as indicated on the next page. In addition, the SHPL will send (by regular mail) test results to municipalities/owners. In the case of positive FC or positive *E.coli.* the SHPL will immediately contact the HR.

4.1 Repeat Sample – Positive Results

The following actions are necessary when a repeat sample tests "positive" for TC, FC, overgrowths, >200 background bacteria and *E. coli.*:

- EPB will notify the responsible ER by phone and by e-mail;
- EPB will e-mail the local HR;
- ER will contact municipality/owner to provide direction and request information as outlined in the positive repeat sample follow-up procedures. (Appendix D);
- ER will review/assess the situation based on discussions with the municipality/owner; technical advice for remedial actions will be provided by phone or an inspection will be conducted as determined by the ER;
- HR will look for evidence of abnormal number of illnesses that could be related to drinking water; and
- other follow-up actions are specified below as well as in Article 4.1.1 to 4.1.3 inclusive;

4.1.1 Repeat Samples – Positive FC

- ER will contact the HR to discuss the results of the information obtained from the positive repeat sample follow-up procedures, the results of any inspections and determine if a PDWA or an EBWO should be issued, if none has been issued during the follow-up of the routine sample;
- if a PDWA is issued the ER will contact the municipality/owner to discuss the required actions. If a EBWO is issued the HR will contact the municipality/owner to discuss the required actions;
- in the event that a PDWA or an EBWO is issued, the ER will advise EPB. HR to advise SH;
- ER will request that the municipality/owner keep them advised on the progress on the remedial actions. The ER will provide updates to the HR on all remedial actions.

4.1.2 Repeat Samples – Positive TC or Overgrowths or >200 Background Bacteria

- ER will contact the HR to discuss the results of the information obtained from the positive repeat sample follow-up procedures, the results of any inspections and determine if a PDWA should be issued, if a PDWA has not been issued during the follow-up of the routine sample;
- in the event that a PDWA is issued, the ER will advise EPB; HR will notify SH; and
- ER will contact the municipality/owner to discuss required actions associated with the PDWA; the ER will request that the municipality/owner keep them advised on the progress on the remedial actions.

4.1.3 Repeat Samples – Positive E. coli

- ER will contact the HR to discuss the results of the information obtained from the positive repeat sample follow-up procedures, the results of the inspection(s) and to determine if an EBWO should be issued;
- HR will issue an EBWO, if necessary, if none has been issued during the follow-up of the routine sample;
- in the event that an EBWO is issued, the ER will advise EPB; HR will advise SH;
- HR will contact the municipality/owner to discuss the required actions; and
- ER will request that the municipality/owner keep them advised on the progress on the remedial actions. ER will keep HR advised.

4.2 Repeat Sample – Negative Results

EPB staff will notify the ER and the local HR by e-mail. Other follow-up actions are specified in Article 4.2.1 to 4.2.2 inclusive.

4.2.1 Repeat Samples – Negative TC, OG, FC and <200 Background Bacteria

- no more samples are required unless an EBWO or a PDWA has been issued;
- if an EBWO or a PDWA has been issued, then the ER will continue to monitor the test results and the municipality/owner's remedial actions; and
- refer to Appendix B – Rescinding an Emergency Boil Water Order or Precautionary Drinking Water Advisory.

4.2.2 Repeat Samples – Negative E. coli

- if an EBWO or a PDWA has been issued, then the ER will continue to monitor the test results and the municipality/owner's remedial actions;
- other actions will be based on the test results of the "special" samples; and
- refer to Appendix B – Rescinding an Emergency Boil Water Order or Precautionary Drinking Water Advisory

5 Special Samples

The SHPL will perform both TC and FC analysis on all special samples. As well, the *E. coli* analysis will be performed on any positive TC or FC plate. Results are provided to EPB and HR as indicated below. In addition, the SHPL will be sending (by regular mail) test results to municipalities/owners. In the case of positive FC or positive *E.Coli*. the SHPL will immediately contact the HR.

5.1 Special Samples – Positive Results

The following actions are necessary when a special sample tests positive for any parameters:

- EPB will notify the ER by phone or by e-mail;
- EPB will e-mail the local HR;
- ER will contact the municipality/owner to provide advice and request information as outlined in the positive special samples follow-up procedures including a review/assessment of the remedial actions that the community has taken to reduce the immediate threats of waterborne pathogens and to ensure the water is safe for consumption and assess the validity of the "special" samples submitted;
- ER will conduct an inspection if no inspection had been conducted earlier;
- HR will continue to look for evidence of abnormal number of illnesses that could be related to drinking water; and
- other follow-up actions are specified below as well as in Article 5.1.1 to 5.1.3.

5.1.1 Special Samples – Positive FC

- HR will issue an EBWO in consultation with the ER. HR to advise SH; ER to advise EPB;
- depending on the test results, an EBWO may be issued for the whole community or just for the specific area (e.g. building) at which the routine and the repeat samples were taken;
- if the test results that FC were only found at the routine sample location, then an EBWO should only be issued for this location. The following actions will be taken:

- the ER will review test results and the municipality/owner's remedial actions and contact the local HR to discuss the possibilities of rescinding the community-wide EBWO, if such an EBWO was issued;
- where they have authority, the HR will investigate the plumbing at that location for possible sources of contamination such as cross connections.
- if the test results show that FC were found at more than one sample location, then the following actions will be taken:
- the HR, in consultation with the ER, will issue a community-wide EBWO; HR to advise SH and ER to advise EPB;
- where they have authority and when there is reason to believe that the source of the contamination is caused by a plumbing system, the HR will conduct a cross-connection survey of the contaminated area of the distribution system; and
- the ER and the HR will contact the municipality/owner and the local HR to discuss the required actions associated with the EBWO.

5.1.2 Special Samples – Positive TC or Overgrowths or >200 Background Bacteria

- if an EBWO or a PDWA has not been issued at an earlier stage, then the ER will contact the local HR to discuss and determine if a PDWA should be issued or wait for the issuance of an EBWO when the *E. coli.* results are available;
- if a PDWA is issued the ER will:
    - advise EPB;
    - contact the municipality/owner to discuss required actions associated with the PDWA which include:
    - conducting remedial work;
    - the collection of further samples (minimum of two (2) sets of three (3) bacteriological samples and to conduct more tests such as turbidity and chlorine residuals on samples from the distribution system);
    - keeping the residents and the ER advised of the municipality/owner's progress on the remedial actions; and
    - keeping the HR advised regarding the municipality/owner's progress on the remedial actions.

5.1.3 Special Samples – Positive E. coli

- if an EBWO or a PDWA has not been issued at an earlier stage, the HR will issue an EBWO in consultation with the ER;
- depending on the tests results, an EBWO may be issued for the whole community or just for the specific area (eg. Building) at which the routine and the repeat samples were taken:
- if the test result show that *E. coli.* were only found at the routine sample location, then an EBWO should only be issued for this location. The following actions will be taken:
    - the ER will review test results and the municipality/owner's remedial actions and contact the local HR to discuss the possibilities of rescinding the community-wide EBWO, if such an EBWO was issued;
    - where they have authority, the HR will investigate the plumbing at that location for possible sources of contamination such as cross connections; or

- if the test results show that *E. coli.* were found at more than one sample location, then the following actions will be taken:
    - the HR, in consultation with ER, will issue a community-wide EBWO; HR to advise SHPL and ER to advise EPB;
    - where they have authority and when there is reason to believe that the source of the contamination is caused by a plumbing system, the HR will conduct a cross-connection survey of the contaminated area of the distribution system;
- the ER and the HR will contact the municipality/owner to discuss required actions associated with the EBWO.

5.2 Special Samples – Negative TC, OG, <200 Background Bacteria, FC and *E. coli*

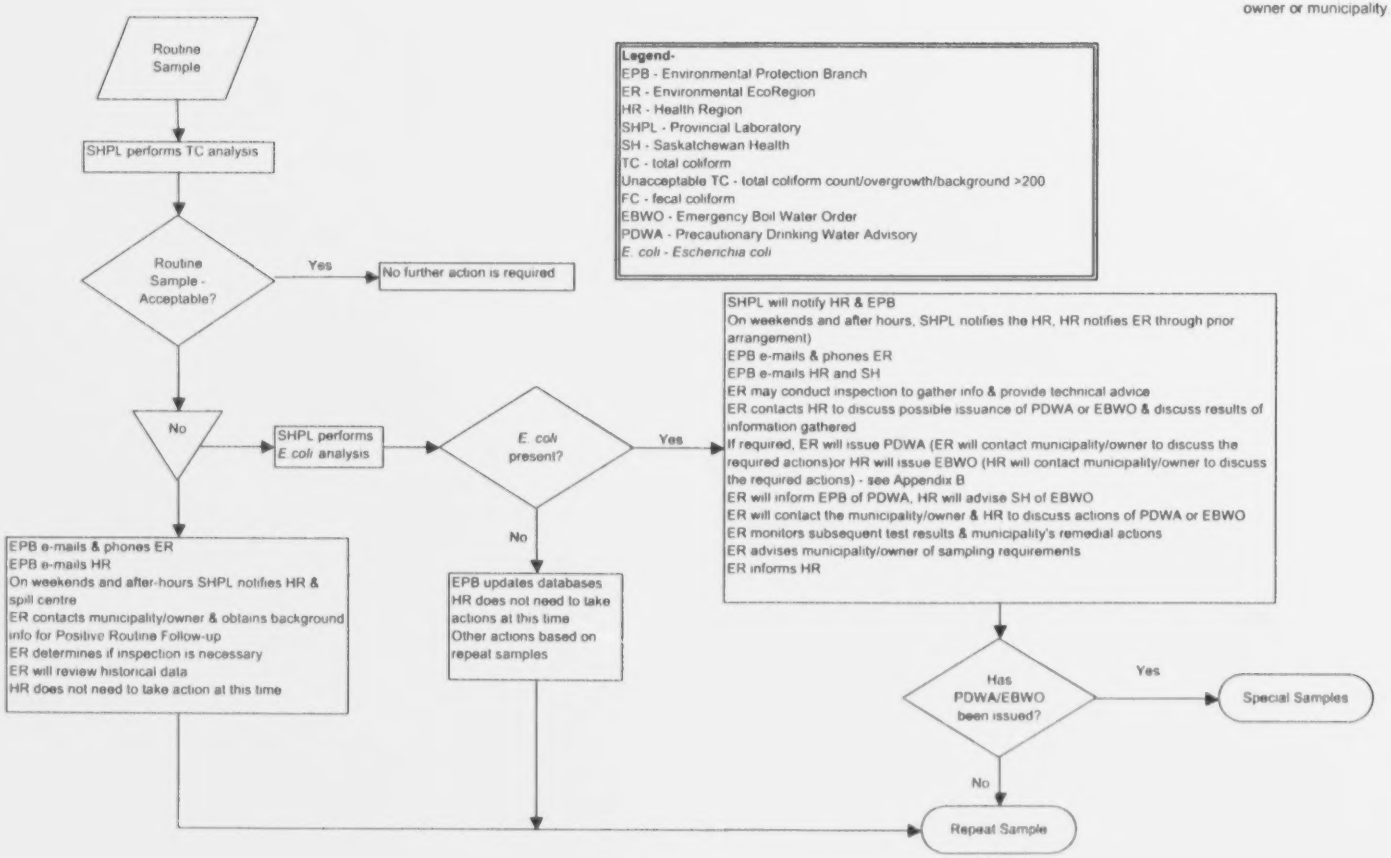
- EPB staff will notify the ER and the local HR by e-mail;
- no more samples are required unless an EBWO or a PDWA has been issued;
- if an EBWO or a PDWA has been issued, then the ER will:
    - continue to monitor the test results and the municipality/owner's remedial actions and will advise the municipality/owner to submit additional samples needed to assess the possibility of rescinding the EBWO or PDWA; and
    - advise the local HR regarding the municipality/owner's progress and to discuss if the EBWO or the PDWA can be rescinded.
- if an EBWO and/or PBWA was not issued or they have been rescinded, then the case is closed and no further follow-up is required.

APPENDIX A

**Summary of Actions to be taken by
the Environmental Protection Branch,
the EcoRegions,
Saskatchewan Health
the Provincial Laboratory
and the Health Regions**

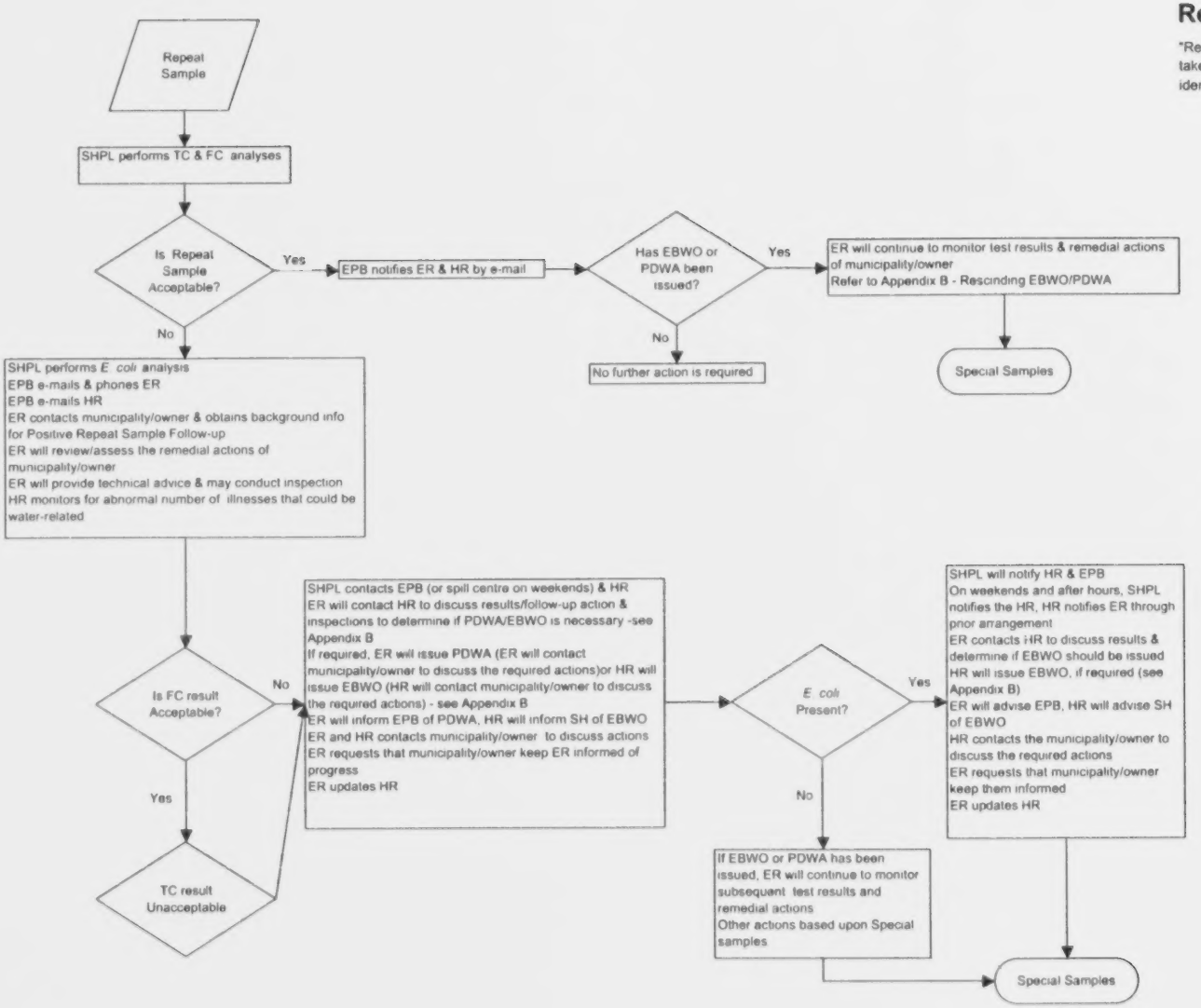
Routine Samples

"Routine" samples mean the water samples taken in a waterworks system to fulfill the sampling requirement as stated in the Permit to Operate issued to the system owner or municipality.


Routine Sample
SHPL performs TC analysis
Routine Sample - Acceptable?
Yes
No further action is required
No
SHPL performs *E. coli* analysis
E. coli present?
Yes
No
EPB e-mails & phones ER
EPB e-mails HR
On weekends and after-hours SHPL notifies HR & spill centre
ER contacts municipality/owner & obtains background info for Posibve Routine Follow-up
ER determines if inspection is necessary
ER will review historical data
HR does not need to take action at this time
EPB updates databases
HR does not need to take actions at this time
Other actions based on repeat samples
SHPL will notify HR & EPB
On weekends and after hours, SHPL notifies the HR, HR notifies ER through prior arrangement)
EPB e-mails & phones ER
EPB e-mails HR and SH
ER may conduct inspection to gather info & provide technical advice
ER contacts HR to discuss possible issuance of PDWA or EBWO & discuss results of information gathered
If required, ER will issue PDWA (ER will contact municipality/owner to discuss the required actions)or HR will issue EBWO (HR will contact municipality/owner to discuss the required actions) - see Appendix B
ER will inform EPB of PDWA, HR will advise SH of EBWO
ER will contact the municipality/owner & HR to discuss actions of PDWA or EBWO
ER monitors subsequent test results & municipality's remedial actions
ER advises municipality/owner of sampling requirements
ER informs HR
Has PDWA/EBWO been issued?
Yes
Special Samples
No
Repeat Sample
Legend-
EPB - Environmental Protection Branch
ER - Environmental EcoRegion
HR - Health Region
SHPL - Provincial Laboratory
SH - Saskatchewan Health
TC - total coliform
Unacceptable TC - total coliform count/overgrowth/background >200
FC - fecal coliform
EBWO - Emergency Boil Water Order
PDWA - Precautionary Drinking Water Advisory
E. coli - *Escherichia coli*

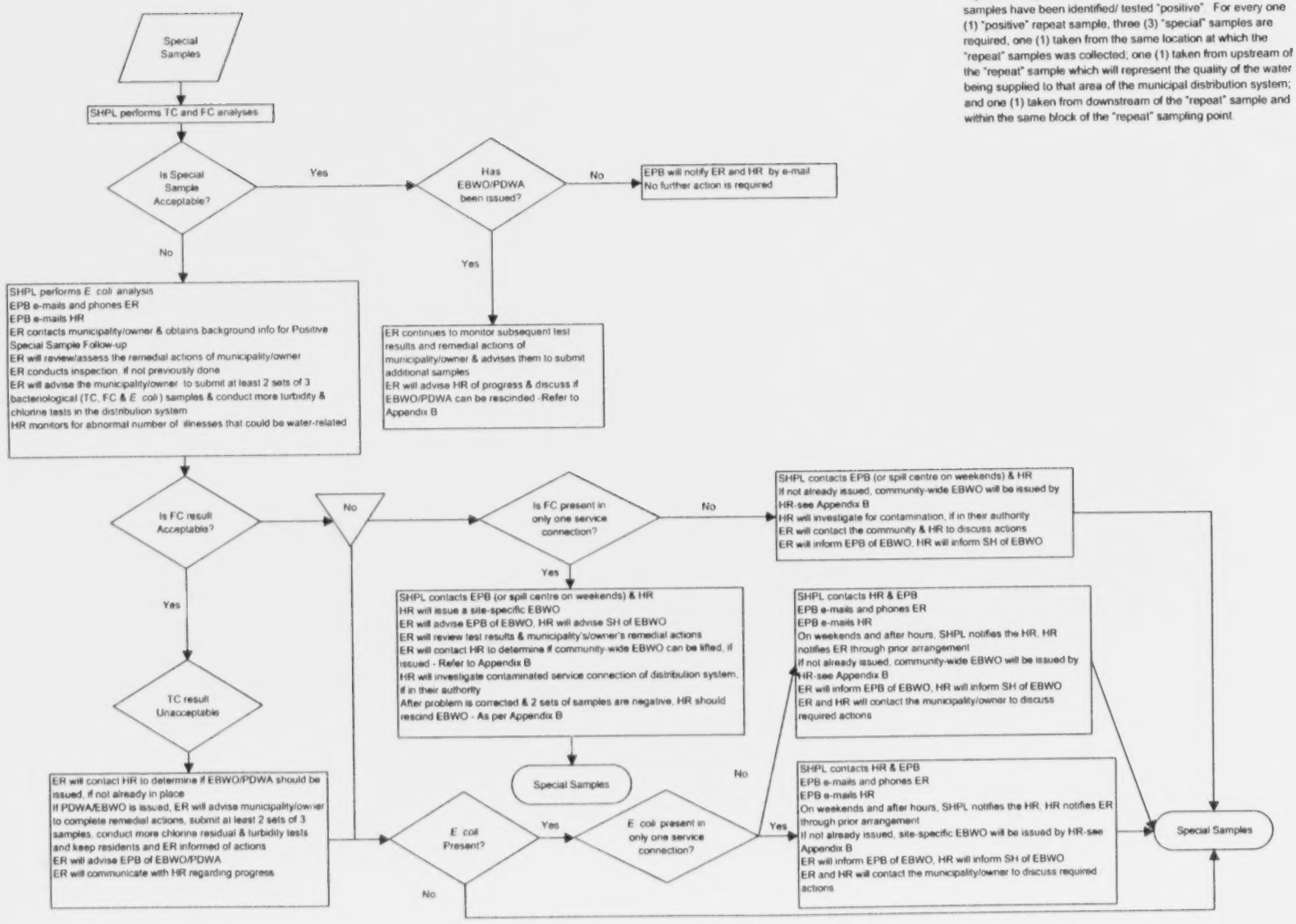
Repeat Samples

"Repeat" samples mean the water samples taken when the "routine" samples have been identified/tested "positive".


Repeat Sample
SHPL performs TC & FC analyses
Is Repeat Sample Acceptable?
Yes
EPB notifies ER & HR by e-mail
Has EBWO or PDWA been issued?
Yes
ER will continue to monitor test results & remedial actions of municipality/owner
Refer to Appendix B - Rescinding EBWO/PDWA
Special Samples
No
No further action is required
No
SHPL performs E. coli analysis
EPB e-mails & phones ER
EPB e-mails HR
ER contacts municipality/owner & obtains background info for Positive Repeat Sample Follow-up
ER will review/assess the remedial actions of municipality/owner
ER will provide technical advice & may conduct inspection
HR monitors for abnormal number of illnesses that could be water-related
Is FC result Acceptable?
No
SHPL contacts EPB (or spill centre on weekends) & HR
ER will contact HR to discuss results/follow-up action & inspections to determine if PDWA/EBWO is necessary -see Appendix B
If required, ER will issue PDWA (ER will contact municipality/owner to discuss the required actions)or HR will issue EBWO (HR will contact municipality/owner to discuss the required actions) - see Appendix B
ER will inform EPB of PDWA, HR will inform SH of EBWO
ER and HR contacts municipality/owner to discuss actions
ER requests that municipality/owner keep ER informed of progress
ER updates HR
E. coli Present?
Yes
SHPL will notify HR & EPB
On weekends and after hours, SHPL notifies the HR, HR notifies ER through pnor arrangement
ER contacts HR to discuss results & determine if EBWO should be issued
HR will issue EBWO, if required (see Appendix B)
ER will advise EPB, HR will advise SH of EBWO
HR contacts the municipality/owner to discuss the required actions
ER requests that municipality/owner keep them informed
ER updates HR
No
If EBWO or PDWA has been issued, ER will continue to monitor subsequent test results and remedial actions
Other actions based upon Special samples
Special Samples
Yes
TC result Unacceptable

Special Samples

"Special" samples mean water samples taken when the "repeat" samples have been identified/ tested "positive". For every one (1) "positive" repeat sample, three (3) "special" samples are required, one (1) taken from the same location at which the "repeat" samples was collected; one (1) taken from upstream of the "repeat" sample which will represent the quality of the water being supplied to that area of the municipal distribution system; and one (1) taken from downstream of the "repeat" sample and within the same block of the "repeat" sampling point.


Special Samples
SHPL performs TC and FC analyses
Is Special Sample Acceptable?
Yes
Has EBWO/PDWA been issued?
No
EPB will notify ER and HR by e-mail
No further action is required
Yes
No
SHPL performs E. coli analysis
EPB e-mails and phones ER
EPB e-mails HR
ER contacts municipality/owner & obtains background info for Positive Special Sample Follow-up
ER will review/assess the remedial actions of municipality/owner
ER conducts inspection, if not previously done
ER will advise the municipality/owner to submit at least 2 sets of 3 bacteriological (TC, FC & E. coli) samples & conduct more turbidity & chlorine tests in the distribution system
HR monitors for abnormal number of illnesses that could be water-related
ER continues to monitor subsequent test results and remedial actions of municipality/owner & advises them to submit additional samples
ER will advise HR of progress & discuss if EBWO/PDWA can be rescinded -Refer to Appendix B
Is FC result Acceptable?
No
Is FC present in only one service connection?
No
SHPL contacts EPB (or spill centre on weekends) & HR
If not already issued, community-wide EBWO will be issued by HR-see Appendix B
HR will investigate for contamination, if in their authority
ER will contact the community & HR to discuss actions
ER will inform EPB of EBWO, HR will inform SH of EBWO
Yes
Yes
SHPL contacts EPB (or spill centre on weekends) & HR
HR will issue a site-specific EBWO
ER will advise EPB of EBWO, HR will advise SH of EBWO
ER will review test results & municipality's/owner's remedial actions
ER will contact HR to determine if community-wide EBWO can be lifted, if issued - Refer to Appendix B
HR will investigate contaminated service connection of distribution system, if in their authority
After problem is corrected & 2 sets of samples are negative, HR should rescind EBWO - As per Appendix B
SHPL contacts HR & EPB
EPB e-mails and phones ER
EPB e-mails HR
On weekends and after hours, SHPL notifies the HR, HR notifies ER through prior arrangement
If not already issued, community-wide EBWO will be issued by HR-see Appendix B
ER will inform EPB of EBWO, HR will inform SH of EBWO
ER and HR will contact the municipality/owner to discuss required actions
TC result Unacceptable
Special Samples
No
SHPL contacts HR & EPB
EPB e-mails and phones ER
EPB e-mails HR
On weekends and after hours, SHPL notifies the HR, HR notifies ER through prior arrangement
If not already issued, site-specific EBWO will be issued by HR-see Appendix B
ER will inform EPB of EBWO, HR will inform SH of EBWO
ER and HR will contact the municipality/owner to discuss required actions
ER will contact HR to determine if EBWO/PDWA should be issued, if not already in place
If PDWA/EBWO is issued, ER will advise municipality/owner to complete remedial actions, submit at least 2 sets of 3 samples, conduct more chlorine residual & turbidity tests and keep residents and ER informed of actions
ER will advise EPB of EBWO/PDWA
ER will communicate with HR regarding progress
E. coli Present?
Yes
E. coli present in only one service connection?
Yes
Special Samples
No
No

APPENDIX B

Guidance for Issuing and Rescinding Emergency Boil Water Orders And Precautionary Drinking Water Advisories

1. Introduction

Eliminating pathogens should be the primary focus when treating and operating public water supplies. The most common form of disease from waterborne pathogens is gastrointestinal illness. The onslaught of this disease, as a result of drinking contaminated water, is sudden. Related health outcomes are not restricted to diarrhea; they can include other illnesses such as reactive arthritis, meningitis, impairment of neurological development and hemolytic-uremic syndrome. In extreme cases, ingestion of pathogens can lead to death; some pathogens have mortality rates as high as 1% of cases. This contrasts with chemicals (many of which have established guidelines), as no acute health effects are sustained from chemical substances at the levels normally found in drinking water.

In order to provide the safest possible drinking water to consumers, all aspects of the multi-barrier approach are necessary. These aspects include source protection; treatment via chemically-assisted filtration and disinfection (or slow sand filtration and disinfection); good operation and maintenance of the waterworks; comprehensive drinking water quality monitoring programs; and appropriate abatement and enforcement measures.

Source Protection – Intake works and wells should be properly located and constructed to protect against contaminants that will be present regardless of protection measures. Surface water and groundwater should be protected through control of waste disposal and restricted land use. Land management practices, watershed/well protection (e.g. well decommissioning) and associated assessment and monitoring activities also play a key role in protecting the integrity of drinking water sources.

Treatment – Appropriate treatment including disinfection of drinking water supplies is crucial with respect to immediate health protection. The recommended minimum treatment requirement for all surface water includes coagulation-flocculation, sedimentation, filtration, taste/odour control and disinfection. Although taste and odour control is an aesthetic process requirement instead of a health related one, it often has a major impact on the public's view about the safety of the drinking water. The public often rejects highly coloured water and turn to alternative supplies of questionable safety. The recommended minimum treatment requirement for groundwater includes continuous disinfection. Special or uncommon treatment process such as lime softening, demineralization, etc., have to be evaluated on a case by case basis.

Operation and Maintenance – Utility operators should adhere to recognized operation and maintenance programs to ensure that all aspects of the waterworks (source, treatment and distribution) are operating optimally. Distribution system programs should include maintenance of appropriate pressure regimens, main assessment, cleaning, repairing and replacement, leak detection and cross-connection control. Industrial customers should be advised of cross-connection control concerns. Programs should also include provisions for operator training/ certification and the assessment of operational needs of a waterworks.

Monitoring – System owners should verify the efficacy and the liability of their waterworks by routinely and systematically conducting water quality monitoring (microbiological, chlorine residual, turbidity and other chemical parameters) and evaluating treatment components. The minimum monitoring requirements are specified in the Permit to Operate.

When all the above public health principles are in place and a system failure or emergency occurs, rapid communication of the problem to the community is crucial. Problems requiring immediate attention include drinking water samples which test positive for microbiological contaminants, failure of disinfection equipment, or upset operational conditions. These problems may warrant actions such as the issuance of an "Emergency Boil Water Order" (EBWO) or a "Precautionary Drinking Water Advisory" (PDWA). **EBWOs are issued by the Medical Health Officer or designate of the local Health Region (HR)**, in consultation with the **ER**, when a threat to the public health exists. **PDWAs are issued by the ER**, in consultation with **HR**, when there is a concern that problems may exist, but the immediate public health threats have not yet been identified.

SE sets objectives for the bacteriological quality of drinking water. The maximum acceptable concentrations for the bacteriological quality are as below:

1. 0 TC per 100 mL; or
2. 0 FC per 100 mL; or
3. No overgrowth or <200 colonies of background bacteria per 100 mL; or
4. No presence of *Escherichia coli*

2. Emergency Boil Water Orders and Precautionary Drinking Water Advisories

There are certain water quality problems that cannot be rectified by boiling yet for which boiling has been considered or advised as a solution. For example, boiling will not destroy the heat-stable cyanobacterial toxins. Boiling drinking water may remove some disinfection by-products (DBPs) but the exact conditions for their complete removal are unknown at this time. Many DBPs are not volatile and are not removed by boiling. For these reasons the most appropriate position to take is that boiling has not been shown to reduce the health risks related to cyanobacterial toxins and DBPs and therefore cannot be recommended as a solution at the present time. However, boiling is an effective way to inactivate all waterborne pathogenic microorganisms.

The presence of FC can be used as a trigger for the issuance of EBWO. However, care should be taken as some species in this group are not indicators of contamination by sewage. For example, *Klebsiella pneumoniae* occur naturally in vegetation and soils as well as in faeces. The adequacy of the treatment and distribution process as well as proper sampling technique should be assessed before issuing an EBWO.

If further tests conducted by swabbing a faecal coliform or a total coliform plate shows that *E. coli* is present, then the water is very likely contaminated with human or animal faecal matter and pathogenic microorganisms may be in the water. If it is determined that the water sample was collected properly, then an EBWO should be issued immediately.

The mere presence of parasitic cysts or oocysts in treated drinking water is not usually sufficient justification for issuing an Emergency Boil Water Order or a Precautionary Drinking Water Advisory. Because the current methods for the routine detection of cysts or oocysts do not measure viability or human infectivity, their public health significance is unknown. Nevertheless, the presence of cysts or oocysts in drinking water receiving full conventional treatment may indicate inadequate filtration, a malfunction in treatment or penetration of sewage into the distribution system. In such cases health officials may wish to monitor the public for the associated gastrointestinal illnesses before considering issuance of an emergency boil water order or a precautionary drinking water advisory. Certain parasitic illnesses such as cryptosporidiosis, may pose a more serious threat to people who have weakened immune systems. Severely immunocompromised individuals should be advised to discuss these risks and remedial measures with their physicians.

The confirmed presence of total coliforms or overgrowth or >200 of background colonies in drinking water indicates that treatment may be inadequate or the distribution system is experiencing bacterial regrowth problems or infiltration. Total coliforms are not necessarily an indication of the presence of faecal contamination. However, the presence of total coliforms in drinking water certainly demonstrates a health risk. If remedial measures such as flushing water mains and increasing chlorine residuals do not correct this problem, then the local HR and the ER may wish to discuss the issuance of a PDWA advising the public to boil their drinking water.

2.1 Emergency Boil Water Orders

EBWOs should only be issued to mitigate confirmed public health threats due to microbial contamination of drinking water. EBWOs should be issued on evidence of:

- confirmed presence of FC combined with inadequate treatment;
- confirmed presence of *E. coli.*;
- confirmed verification of problems identified through the positive follow-up procedure questions and/or an inspection; or
- where epidemiological evidence indicates that the drinking water is responsible for an outbreak of illness (such as gastrointestinal illnesses).

2.2 Precautionary Drinking Water Advisories

PDWAs could be issued when there is a concern that problems (due to microbial or chemical contamination) may exist. In a case of possible microbial contamination, the PDWA should be used to advise the public to boil the water. In a case where there is chemical contamination, the public will not be advised to boil the water, but may be advised to look for alternative water sources of confirmed acceptable quality. PDWAs should be issued on evidence of:

- significant deterioration in source water quality (i.e. high turbidity due to runoff and other events);
- persistently low chlorine/disinfectant residuals (ie <0.5 mg/L of total chlorine residual or <0.1 mg/L o free chlorine residual);
- the bacteriological monitoring results show persistent total coliforms and overgrowths;
- lack of adequate treatment component(s) or equipment malfunctions in the treatment plant or disinfection system; or
- persistently high concentration of chemical parameters such as arsenic, boron, trihalomethanes, etc.

Rescinding an Emergency Boil Water Order or Precautionary Drinking Water Advisory
EBWOs or PDWAs are usually rescinded as soon as the microbiological quality, turbidity, particle counts and disinfection residual of the treated water in at **least two consecutive sets of samples – test results**[3] have returned to acceptable levels and/or when the treatment or distribution malfunction has been corrected and sufficient water displacement, with water of confirmed acceptable quality, has occurred in the distribution system to eliminate any remaining contaminated water. The ER through consultation with the HR may require enhanced monitoring requirements (e.g. increased chlorine residual testing/reporting, turbidity monitoring and bacteriological sampling) to be carried out by the municipality/owner until confidence in the operation of the water system is re-established.

In the case of a disease outbreak, EBWOs are usually rescinded after the above conditions has been met and when surveillance indicates that the incidence of the illness in the community has returned to background levels. Owing to lengthy incubation periods for some pathogens and their secondary spread, new cases of illness may occur after the period of contamination has passed. Conversely, a lack of new cases may indicate that the advisory is being followed and not that the causative situation has been rectified.

3. Communication

When a bacteriological problem occurs the lead spokesperson or agency for dealing with the media will be ER for the issuance of a PDWA and the HR for the issuance of an EBWO. ER and the HR will make arrangements to set up after hours contact during the incident. All media releases will be dealt with as a joint effort with the lead agency being determined by the type of advisory issued. All EBWO's and PDWA's will be posted on the SE website. Copies of all media releases will be forwarded to SE and SH. Media releases for SE will be handled by SE's Communication Branch.

If an EBWO or PDWA is issued the HR/ER will ensure that the municipality/owner of the supply:

a) Notifies all consumers [4] of the EBWO or PDWA and the restrictions of usage of the water (notification will consist of advising door to door where reasonable as well as use of the media where required);

b) keeps the consumers and the ER and the HR advised of the community's progress on the remedial actions; and

b) periodically re-notifies the consumers in the event of an extended EBWO/PDWA.

The Drinking Water Quality Section, Environmental Protection Branch will be available to assist the ERs and HRs to quickly respond any drinking water related incident that has had or may have had an affect on water quality or public health that cannot be handled at the local level. This arrangement will also allow for prompt communication of the order/advisory and related health risks between elected officials and the public through the services of the news media.

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[3] The two sets of samples should be taken at least one day apart. A set of samples should consist of least three samples, collected in the same day, from three different representative locations in the distribution system.

[4] Consumers will include all individuals within the community that use the water, commercial water haulers and private consumers that haul the water.

If the HR receives a complaint from an individual that it is connected to an SE regulated system, the HR will advise the ER and work jointly on follow-up.

In order to keep the SE website current, EPB will be kept advised of all EBWOs and PDWAs that have been issued or rescinded.

The SHPL will call the HR to notify of any positive FC and positive *E. coli.* samples reported on a Saturday.

The HR will contact Environmental Project Officers directly using the information provided in Appendix F. If after trying to contact the local Environmental Project Officers unsuccessfully, after hour calls or emergencies will be handled by SE's Spill Report Centre. The Spill Report Centre 1-800-667-7525 will be provided with contact names for each ER. In most cases the Environmental Project Officer would be made aware of a positive bacteriological sample during normal working hours and would only have to be available for the results of the *E.coli.* test on the weekend. The Environmental Project Officer should make arrangements to be available or a replacement available on the weekend if a routine positive has arrived on a Friday. The Environmental Project Officer should contact the MHO and make arrangements to be called after the SHPL has contacted the MHO with the results of the *E.coli.* test. Follow-up action will be determined by the results of the test.

APPENDIX C

Sampling Procedure for Bacteriological Quality

1. Locate a sample collection location that is:
   - Not a faucet connected to a point of use water treatment device;
   - Not a hydrant, a hose or a faucet located outside of the building.
2. Ensure that there is no strainer on a faucet.
3. Wash hands carefully.
4. Leave the water running for two (2) to three (3) minutes.
5. Perform free and total chlorine residual tests and turbidity and record the results on the form which is to be submitted with the sample.
6. Reduce the flow to a steady stream.
7. Take the cap off the bottle and hold it in one hand and the bottle in the other. **Do not rinse the bottle.** Use a new bottle, if you do.
8. **Do not lay the cap down or drop it. Do not touch the inside of the cap or the mouth of the bottle.** Use a new bottle, if you do.
9. Carefully fill the bottle until the water is within one (1) inch from the top.
10. Put the cap back on the bottle such that the inside of the cap or the mouth of the bottle are untouched. Write the community name on the space provided on the sample bottle.
11. Fill in the sample form and **immediately** send it and the water bottle to the Provincial Laboratories in the supplied container. A sample collected on Thursday, Friday, or Saturday should be sent by courier or bus, since it may not get to the Provincial Lab by Saturday. **A sample older than three (3) days will not be tested for bacteria!**

NOTE: Flaming or disinfecting of the tap prior to bacteriological sampling is not required for SE regulated systems. The Environment Project Officer (EPO) will assist the municipality/ owner with establishing approved locations for the collection of the bacteriological samples as required in the Permit to Operate the Waterworks.

APPENDIX D

Positive Bacteriological Follow-up Procedures

Positive Routine Sample Follow-up Guidelines

Date:
Municipality/owner:
Person Contacted/Position:
Location of Sample:
Sample Result:

- total chlorine:
- free chlorine:
- turbidity:
- **Who collected the sample:**
- **What is the exact sampling location (type of faucet)?**
- **Was there a point of use treatment device or water softener on-line?**
- **How long did the water run prior to collecting the sample?**
- **Was the screen/aerator/rubber gasket removed?**
- **Is there any leakage from internal parts?**
- **Was the shrink tape removed prior to opening the bottle?**
- **Was the inside of the cap or neck of the bottle touched?**
- **Was the bottle filled and capped without rinsing?**
- **Was the sample promptly mailed to the laboratory?**
- **Water Treatment Plant:**
  - chlorine dosage rate:
  - total chlorine:
  - free chlorine:
  - turbidity:
- **Have there been any problems with your water system (source, treatment plant, MDS)?**
- **Advise the community to check the "repeat sample" box on the bacteriological form.**
- Advise community that a "repeat" sample collected on Thursday, Friday or Saturday should be sent by courier or by bus instead of regular mail, since it may not get to the Provincial Laboratory by Saturday. **A sample older than three (3) days will not be tested for bacteria.**
- **Date "repeat" sample was requested to be taken on.**

Comments:

Environmental Project Officer's Initials:

Positive Repeat Sample Follow-up Guidelines

Date:
Municipality/Owner:
Person Contacted/Position:
Location of Sample:
Sample Result:

- total chlorine:
- free chlorine:
- turbidity:

- **Were there any problems in collecting the sample?**
- **Water Treatment Plant:**
  - chlorine dosage rate:
  - total chlorine residual:
  - free chlorine residual:
  - turbidity:
- **Is the potable water being continuously chlorinated?**
- **Have there been any interruptions in the chlorination process since the taking of the sample?**
- **Have there been any interruptions in the treatment process?**
- **Have there been any interruptions in the distribution system?**
- **When was the system last flushed and was anything unusual noticed at that time?**
- **Has the system been depressurized lately?**
- **Location and type of recent repair**
- **Were mains sanitized at the time of repair?**
- **Were all valves checked for operation?**
- **Is there a possibility of cross-connections?**
- **Has there been any new construction on the system?**
- **Have there been any consumer complaints?**
- **Advise the community to do the following remedial work prior to collection of the special samples.**
- **Advice the community to collect three special samples and check the "special" box on the bacteriological form.**
- Advise community that "special" samples collected on Thursday, Friday, or Saturday should be sent by courier or by bus instead of regular mail, since they may not get to the Provincial Laboratory by Saturday, **samples older than three (3) days will not be tested for bacteria.**
- **Location of Special Samples**
- **Date "special" samples were requested to be taken on:**

Comments:

Environmental Project Officer's Initials:

Positive Special Samples Follow-up Guidelines

Date:

Municipality/Owner:

Location	Result	Total Chlorine	Free Chlorine	Turbidity

Remedial work done by the Community prior to the "special" samples being collected:

Environmental Project Officer's Inspection

Date:

Persons in community interviewed:

Observations:

Recommendations made to the community:

Environmental Protection Branch Contact:

Discussion with Branch and Regional Management:

Health Region Contact:

Discussion with Health Region:
Person in Community Contacted:

Follow-up Requested:

Location of "special" samples:

Date "special" samples were requested to be taken:

Advise community that "special" sample collected on Thursday, Friday or Saturday should be sent by courier or by bus instead of regular mail, since it may not get to the Provincial Laboratory by Saturday. **A sample older than three (3) days will not be tested for bacteria.**

Comments:

Environmental Project Officer's Initials:

APPENDIX E

Model of a Precautionary Drinking Water Advisory, Emergency Boil Water Order and an Emergency Boil Water Notice

Saskatchewan
Environment

Precautionary Drinking Water Advisory

This Advisory applies to all residents and users of the _____ and is effective immediately.

Pursuant to clause 32(1)(a) of *The Environmental Management and Protection Act 2002* this Precautionary Drinking Water Advisory is issued due to (state reasons)_____ _____and therefore the safety of *[Name of System]* drinking water supply cannot be ensured at all times. Therefore, pursuant to Clause 32(1)(b) of *The Environmental Management and Protection Act 2002,* consumers must be notified to:

(a) boil all water, used for drinking purposes, for at least one (1) minute, at a rolling boil, prior to use;

(b) boil water to be used for other activities where it may be ingested, including:
- (i) brushing teeth or soaking false teeth;
- (ii) washing fruits and vegetables;
- (iii) food or drink which will not be subsequently heated; and
- (iv) ice cubes;

(c) not drink from any public drinking fountains supplied with water from the public water supply;

(d) under most circumstances, not need to boil water used for other household purposes. Adults, adolescents and older children may shower, bathe or wash using tap water but should avoid swallowing the water. Dishes and laundry may be washed in tap water, either by hand or by machine;

(e) ensure that younger children and infants are sponge bathed;

(f) use an alternative water source known to be safe, if they do not wish to boil the water; and

(g) consult with your physician if you have cuts or rashes that are severe before using the water.

If you require any additional information, please contact the following:

Municipal Office	306 - _____-_____
Saskatchewan Environment -_____Region	306 - _____-_____
_____ Health Region	306 - _____-_____

Order to Remedy a
Health Hazard Associated with Water

This order given this _____(date) pursuant to Section 25 of *The Public Health Act, 1994*.

To: (Municipality or owner/operator of the water supply)

Whereas you are responsible for the following health hazard:

The (presence of contaminates or lack of minimum treatment), namely (list)_____(in, for) the public water supply provided by you to the municipality(ies) of _____.

Pursuant to Section 25 of *The Public Health Act, 1994*, you are hereby ordered to remedy the health hazard by:

1. Take all reasonable steps to immediately notify all users of the public water supply of the (presence of unacceptable bacteria levels or lack of adequate disinfection) and the steps necessary to make the water supply safe, including:
   (a) boiling all water used for drinking purposes for at least one minute, at a rolling boil, prior to usage;
   (b) advising that such boiled water should be used as the water for other activities where it may be ingested, including:
      (i) tooth brushing or soaking false teeth;
      (ii) dishwashing, unless sanitized in another fashion;
      (iii) food or drink which will not be subsequently heated;
      (iv) ice cubes
   (c) advising persons providing food or drink to the public to ensure all water that will be consumed by the public is boiled and to make unoperational all public drinking fountains supplies with water from the public water supply.
   (d) making the attached "Emergency Boil Water Notice" available to users of the public water supply by:
      (i) posting in conspicuous places in public buildings and areas in the municipality(ies).
      (ii) (list any other appropriate methods for the circumstance – newspaper, distribute copies. etc.);
   (e) advising persons not wishing to boil water that they should use an alternative water source known to be safe.

2. This Order remains in effect until safe water evidenced by two successive tests of the public water supply taken 24 hours apart (or minimum disinfection treatment is restored).

NOTE TO MEDICAL HEALTH OFFICER OR DESIGNATE: This Order should be accompanied by a cover letter, which includes a statement similar to the following: You may appeal this Order in accordance with Section 11 of the Public Appeals Regulations (excerpt for the regulations, pages 5-10, attached).

_____
Medical Health Officer or Designate

Health Region

Emergency Boil Water Notice

To all residents of the
Municipality of

Effective _____(date) and until further notice.

Water from the (Name of Municipality) water supply and distribution system should be boiled, at a rolling boil, for at least one minute before using to ensure bacteriological safety. Those individuals not wishing to boil water should make use of an alternate water source that is known to be safe.

This Emergency Boil Water Notice also applies to any water which may enter a person's mouth, such as water used for tooth brushing, soaking false teeth and water put into food or drink which will not be subsequently heated. Since harmful bacteria may survive freezing, ice cubes should also be made from previously boiled water.

In addition to the above, all dishes and utensils should be soaked in a bleach water solution (approximately 2 tablespoons of bleach per gallon or 10 ml of bleach per liter of water) for at least two minutes after being washed to kill any bacteria which may be present.

Do NOT mix bleach with soaps and detergents

The Emergency Boil Water Notice remains in effect until improvements are made to the water system which will ensure a safe supply at all times and pending resulting of further water tests. If you require any additional information, please contact the Municipality at _____ or Public Health Inspection at _____.

APPENDIX F

For After Hours Emergency Contact:

Please call the Department's 24-hour Spill Emergency Line at 1-800-667-7525 or (306) 953-2980 when outside of province.

<table>
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Environmental Protection Branch-Regina
FAX – Regina (306) 787-0197

Drinking Water Inquiries – General
Marianne Fabian (306) 787-6504 mfabian@serm.gov.sk.ca

Bacteriological Reporting
Kim Bell (lead)…(306) 787-6595 kbell@serm.gov.sk.ca
Marianne Fabian (backup).(306) 787-6504
mfabian@serm.gov.sk.ca
Shaun Hase (backup). (306) 787-9138 shase@serm.gov.sk.ca

Drinking Water Advisory Tracking
Marianne Fabian (lead) (306) 787-6504
mfabian@serm.gov.sk.ca
Kim Bell (backup) (306) 787-6595 kbell@serm.gov.sk.ca
Shaun Hase (backup) (306) 787-9138 shase@serm.gov.sk.ca

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East Boreal EcoRegion
FAX – Prince Albert (306) 953-2502
FAX – Melfort (306) 752-6168

EcoRegion Manager
Len Sinclair (306) 953-2662 lsinclair@serm.gov.sk.ca
Len Sinclair (Cell Phone) (306) 961-9434

EPO Prince Albert
Janice Hembruch (306) 953-2296
jhembruch@serm.gov.sk.ca
Janice Hembruch (Cell Phone) (306) 961-8400

Richard Snider .(306) 953-3239 rsnider@serm.gov.sk.ca
Richard Snider (Cell Phone) (306) 961-5608

Kevin Nagy (306) 953-3369 knagy@serm.gov.sk.ca
Kevin Nagy (Cell Phone) .(306) 961-8448

EPO Prince Albert (City of Prince Albert)
Todd Swenson (306) 953-3477 tswenson@serm.gov.sk.ca
Todd Swenson (Cell Phone)…(306) 961-7240

EPO Melfort
Bob Busch….(306) 752-6129 bbusch@serm.gov.sk.ca
Bob Busch (Cell Phone) .(306) 921-7395

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West Boreal EcoRegion
FAX – Meadow Lake……...(306) 236-7677

EcoRegion Manager
Bill Miller….(306) 236-7673 bmiller@serm.gov.sk.ca
Bill Miller (Cell Phone)…(306) 236-8564

EPO Meadow Lake
Ron Cummins….(306) 236-7645 rcummins@serm.gov.sk.ca
Ron Cummins (Cell Phone) .(306) 236-9429

Michael McMurray….(306) 236-0403
mmcmurray@serm.gov.sk.ca
Michael McMurray (Cell Phone)…(306) 240-7747

Darren Letkeman…(306) 236-7697 dletkeman@serm.gov.sk.ca
Darren Letkeman (Cell Phone) (306) 236-9429

Todd Pettigrew….(306) 236-7597 tpettigrew@serm.gov.sk.ca
Todd Pettigrew (Cell Phone) (306) 240-7747

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Shield EcoRegion
FAX – La Ronge…(306) 425-4673

EcoRegion Manager
Rob Kidd…(306) 425-4310 rkidd@serm.gov.sk.ca

EPO La Ronge
Warren Kelly….(306) 425-4581 wkelly@serm.gov.sk.ca
Warren Kelly (Cell Phone) .(306) 425-9668

Brent Keevill….(306) 425-4658 bkeevill@serm.gov.sk.ca
Brent Keevill (Cell Phone)…(306) 425-8884

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Grassland EcoRegion
FAX – Regina.....(306) 787-8280
FAX – Estevan.....(306) 637-4603
FAX – Swift Current.....(306) 778-8212
FAX – Moose Jaw.....(306) 694-3743

EcoRegion Manager
Chuck Bosgoed (306) 787-6205 cbosgoed@serm.gov.sk.ca
Chuck Bosgoed (Cell Phone)..(306) 536-1833

EPO Regina
Alvin Yuen (Regina) (306) 787-5971 ayuen@serm.gov.sk.ca
Alvin Yuen (Cell Phone) .(306) 536-9412

Dennis Perras...(306) 787-6199 dperras@serm.sk.ca
Dennis Perras (Cell Phone)....(306) 539-4188

Jeff Paterson .(306) 787-8253 jpaterson@serm.gov.sk.ca

EPO Estevan
Brent Wilson...(306) 637-4604 bwilson@serm.gov.sk.ca
Brent Wilson (Cell Phone) .(306) 421-0620

EPO Swift Current
Rod Lemon..(306) 778-8642 rlemon@serm.gov.sk.ca
Rod Lemon (Cell Phone)..(306) 741-7718

Sarah Barton....(306) 778-8429 sbarton@serm.gov.sk.ca
Sarah Barton (Cell Phone)...(306) 741-7504

Jeff Bodie (306) 778-8685 jbodie@serm.gov.sk.ca
Jeff Bodie (Cell Phone)...(306) 741-9850

EPO Moose Jaw
Greg Holovach .(306) 694-3586 gholovach@serm.gov.sk.ca
Greg Holovach (Cell Phone) (306) 631-1296

Parkland EcoRegion
FAX – Saskatoon.....(306) 933-8442
FAX – Moose Mountain.....(306) 577-2622
FAX – North Battleford.....(306) 446-7464
FAX – Watrous.....(306) 946-3221
FAX – Yorkton.....(306) 786-5716

EcoRegion Manager
Wes Kotyk, A/Manager.(306) 933-6542
wkotyk@serm.gov.sk.ca
(Cell Phone).(306) 227-4711

EPO Melville
Gary Clouthier....(306) 728-7492 gclouthier@serm.gov.sk.ca
Gary Clouthier (Cell Phone)..(306) 728-7091

EPO Moose Mountain
Sean Bayer....(306) 577-2605 sbayer@serm.gov.sk.ca
Sean Bayer (Cell Phone)....(306) 736-8040

EPO North Battleford
Scott Meekma....(306) 446-7683 smeekma@serm.gov.sk.ca
Scott Meekma (Cell Phone)(306) 441-5774

Mike Rathwell (306) 446-7987 mrathwell@serm.gov.sk.ca
Mike Rathwell (Cell Phone)...(306) 441-6063

EPO Saskatoon
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Cypress Health Region 350 Cheadle Street West SWIFT CURRENT SK S9H 4G3 PH: 778-5280 // FAX: 778-5408 MHO: Dr. Khami Chokani 778-5258 SR. PHI: John Bower 778-5417	**Sunrise Health Region** 72 Smith Street East YORKTON SK S3N 2Y4 PH: 786-0600 // FAX: 786-0620 MHO: Dr. Saqib Shahab 786-0606 SR. PHI: Gilbert Combres 786-0618
Regina Qu'Appelle Health Region Community Health Division 2110 Hamilton Street REGINA SK S4P 2E3 PH: 766-7777 FAX: 766-7730(PHIs) // 766-7607 (MHOs) MHO: Dr. Tania Diener(Mail) 766-7774 Deputy MHO: Dr. Maurice Hennink 766-7772 ENV.HEALTH: Yvonne Graff 766-7756 PHI Supervisor: Bob Stone 766-7714	**Saskatoon Health Region** Safe Communities, Public Health Services #101 – 310 Idylwyld Drive North SASKATOON SK S7L 0Z2 PH: 655-4605 FAX: 655-4718 (PHIs) // 655-4414 (MHOs) MHO: Dr. Cory Neudorf 655-4722 DMHO: Dr. Stephen Whitehead 655-4765 MGR., SAFE COMMUNITIES Bryce Graham 655-4715
Heartland Health Region Box 1300 ROSETOWN SK S0L 2V0 PH: 882-6413 // FAX: 882-6474 MHO: Dr. Khami Chokani 882-4690 SR. PHI: Ron Belak 882-4659	**Kelsey Trail Health Region** Box 6500 MELFORT SK S0E 1A0 PH: 752-6310 // FAX: 752-6353 MHO: Vacant 446-6426 *(Dr. Brenda Cholin covering)* Env. Health: Doug Terry 752-6321 Co-ordinator
Prince Albert Parkland Health Region Public Health 1521 – 6th Avenue West PRINCE ALBERT SK S6V 5K1 PH: 765-6600 // FAX: 765-6624 MHO: Dr. Leo Lanoie 953-6235/765-6601 SR. PHI: Brenda Ziegler 765-6605	**Prairie North Health Region** Room 204, Prov. Bldg., 1146 – 102nd Street NORTH BATTLEFORD SK S9A 1E9 PH: 446-6400 // FAX: 446-6432 MHO: Dr. Brenda Cholin 446-6426 SR.PHI: Richard Koroluk 446-6418
Mamawetan/Churchill River Box 6000 LA RONGE SK S0J 1L0 PH: 425-8512 FAX: 425-8550 (PHIs) // 425-8530 (MHOs) MHO: Dr. James Irvine 425-8585 MANAGER OF ENV. HEALTH Jane Lyster 425-8523	**Saskatchewan Health** Chief MHO, Dr. Ross Findlater 787-3235 Deputy Chief MHO, Dr. Eric Young 787-3220 Epidemiologist, Dr. William Osei 787-1580 Louis Corkery 787-7129 Tim Macaulay 787-7128 FAX 787-3237
Health Canada First Nation and Inuit Health Branch 1920 Broad Street REGINA SK S4P 3V2 MHO, Dr. Shauna Hudson 780-6561 FAX: 780-7733 Regional EHO, Tim Bonish 780-5453 Occupational Health & Safety Program EHO, Alan Sales 780-7165 // FAX: 780-6796	

Other Contacts: February, 2003

EnviroTest – Saskatoon (306) 668-8370	**Prairie Diagnostic Services Lab** (306) 787-6435 in Regina
Saskatchewan Watershed Authority Room 101, 2022 Cornwall Street REGINA, SK S4P 3Z3 Telephone: (306) 787-0726 // Fax: (306) 787-0780 As of October 1, 2002, the Saskatchewan Wetland Conservation Corporation became part of the new Saskatchewan Watershed Authority.	**Saskatchewan Health Provincial Laboratory** 3211 Albert Street REGINA, SK General Inquiry: 1-866-450-0000 Ph: (306) 798-2125 // Fax: (306) 798-0071 Information provided includes result verification, scheduling, availability of tests, special requirements, billing charges, additional copies of reports, sample containers, bacteria analysis and major ion analysis
Sask Water Environmental Sciences - Saskatoon 1-866-TEST-H20 // (1-866-837-8420)	**Saskatchewan Research Council (SRC)** Analytical Lab, 1-800-240-8808

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Northwest Regional Water Resource Office - North Battleford, General Line 446-7450
Southwest Regional Water Resource Office - Swift Current. General Line 778-8257
Southeast Regional Water Resource Office – Weyburn, General Line 848-2345
East Central Regional Water Resource Office – Yorkton, General Line 786-1490

Web Sites & E-mail Addresses
Saskatchewan Environment - www.se.gov.sk.ca
Saskatchewan Government – www.gov.sk.ca
Saskatchewan Health - www.health.gov.sk.ca
Saskatchewan Research Council - www.src.sk.ca
Saskatchewan Water Corporation - www.saskwater.com
Saskatchewan Water Corporation – e-mail: first initial last name@saskwater.com
Saskatchewan Watershed Authority: http://www.wetland.sk.ca